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ABSTRACT

This paper contributes to the knowledge about the effects that magnet schools have on improving educational quality. The history of magnet schools in American education is examined, linking it with several recent movements to reform and reorganize schooling. A synthesis of research findings from 12 district studies of magnet schools and various other studies conducted in the past 6 years provides data that are examined. The studies focus on magnet high schools' distribution, their educational effects on students, and their effects on education district-wide. Both the data from the studies and the studies themselves are evaluated. The implications of the various studies' findings on educational effects for education decision-makers are discussed, and specific recommendations for improving research for analyzing educational effects of magnet schools are made. Thirty-seven references are included. A list of the 12 district studies is appended. Table 1 provides the data on enrollment trends in magnet schools from 1982-83 and 1988-89. Table 2 provides an analysis of measures and findings on educational effects from the 12 studies. Three figures are also included. (JS)

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EDUCATIONAL EFFECTS OF MAGNET HIGH SCHOOLS

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EXECUTIVE SUMMARY

EDUCATIONAL EFFECTS OF MAGNET HIGH SCHOOLS

The magnet school has become one of the main tools for innovation in the organization of urban education. Education decision-makers at national, state, and local levels have recognized a combination of attributes in the concept of magnet schools that have the potential for addressing the important policy issues of school desegregation, choice, and education quality.

While many magnet schools expand diversity and choice and increase the heterogeneity of the school population, the model also brings the possibility of disparity in the quality of education between magnet schools and traditional neighborhood schools. Magnet schools could produce a bifurcation of public education into two tiers: special opportunities for selected students in one set of schools and lower quality education for the remaining students in neighborhood schools. Concern with the distribution of magnet school opportunities is increasing as educators work to decrease high rates of dropping out from urban schools. With increased interest in broadening choice in public education beyond magnet schools within districts to choice of any school across districts, questions about who benefits from choice have been raised, and the lessons that can be learned from the experience with magnet schools have become more important.

This research synthesis was designed to address three questions concerning the extent to which education quality is advanced through magnet schools. The results can shed light on the potential for education quality through choice.

First, what do we know about the scope of magnet high schools in public education? What types of students are served? Available current data show that magnet schools are playing a larger role in urban education than they were six years ago. The average urban district with magnet school programs has over 50 percent more students in magnet schools than in 1983, with the average district enrollment in magnet schools in 1989 at 10,300 students. At the high school level, about 20 percent of students are in magnet schools in the average urban district. Analysis of research and evaluation reports on magnet schools from 12 urban school districts shows that selective academic criteria for enrolling students may be used in a lower proportion of magnet schools now than in 1983 when a national student examined student selection standards. The analysis showed that less than one-fourth of magnet schools in seven districts reporting selection information use any criteria for student selection based on prior academic performance. However, in magnet schools that are "non-selective," the self-selection of students through voluntary enrollment tends to produce an entering student group with better academic achievement than the district average.

A second question concerns outcomes of magnet schools. To what extent do magnet high schools advance student learning? What accounts for differences in the educational effectiveness of magnet high schools? The studies which used more complex research models show magnet schools have positive effects on outcomes. Virtually all the studies reviewed show that average test scores of students in magnet schools are higher than scores for non-magnet schools. However, some studies do not account for student

background and prior achievement. The findings of studies that measure change in magnet student scores with those for similar non-magnet students showed that magnet schools improve student outcomes, but the strongest effects on achievement are in specific subjects and the size of magnet effects vary by school and by grade.

The 1983 national study of magnet schools found that three magnet school policy and organization variables were significantly related to quality of education processes and outcomes (with statistical controls for factors such as student characteristics and school resources): (a) principal leadership, (b) coherence between the magnet theme and the curriculum and staffing, and (c) district policy commitment and flexibility with procedures. The "coherence" variable measured whether the magnet school actually delivered what it advertised, that is the degree to which the school offered any unique, quality elements in its curriculum and program. This kind of measure would be useful in addressing concerns about education effects that have been raised in the debate about broader programs of choice.

Third, the paper examines existing research findings on overall effects of magnet high schools on education in a school district. Does education in non-magnet schools suffer when magnet schools thrive? The question of whether improved outcomes of magnet schools comes at the expense of reduced effectiveness in non-magnet schools was not directly addressed by the studies reviewed. This kind of analysis requires tracking student transfers and analyzing trends in education outcomes over time in magnet and non-magnet schools. The synthesis produced limited findings that could shed light on this issue. For example, the data show that magnet schools are producing an increased demand for opportunities. Some districts, such as Houston, San Diego, and St. Paul have expanded the size of magnet programs significantly. Other districts such as Buffalo, Cincinnati, and Pittsburgh have sizable programs but low rates of acceptance and only small increases in their programs. While most magnet schools are not academically selective, they do attract some of the most talented students and leaves non-magnet schools with higher proportions of students at risk.

The paper discusses the implications of findings on educational effects for urban education decision-makers and recommendations are made for improving research models for analyzing educational effects of magnet schools.

EDUCATIONAL EFFECTS OF MAGNET HIGH SCHOOLS

INTRODUCTION

The magnet school has become one of the main tools for innovation in the organization of urban education in the United States. Growth in implementation of the concept has been rapid. The first magnet schools were designed in the early 1970s; in 1982-83, one-third of the largest urban districts had magnet schools; and today it would be difficult to find an urban school system without a magnet school program. Education decision-makers at national, state, and local levels have recognized a combination of attributes in the concept of magnet schools that have the potential to address important policy issues of school desegregation, choice, and education quality.

This paper is designed to contribute to knowledge about the effects that magnet schools have on improving educational quality. Through a synthesis of research findings, we examine evidence on magnet high schools' distribution, their educational effects on students, and their effects on education district-wide. In this synthesis, when we refer to magnet schools, we refer to grade levels K-12. Observations related specifically to magnet high schools are so noted.

MAGNET SCHOOLS AS EDUCATIONAL INNOVATIONS

The magnet school has a short history in American education, but it has been linked with several recent movements to reform and reorganize schooling. In order to analyze the educational effects of magnet schools, or to ask appropriate research questions, it is important to understand the significant role that magnet schools have played as a method of educational innovation at national, state, and local levels.

A "magnet school" has come to be defined and interpreted in different ways across the country. In this analysis, a magnet school will be defined as a school, or program within a school, that has four characteristics:

> a) a special curricular theme or method of instruction,
> b) a role in voluntary desegregation within a district,
> c) choice of school by student and parent, and
> d) access to students beyond a regular attendance zone.
> (Fleming, Blank, Dentler, & Baltzell, 1982, from federal grant regulations for the Emergency School Aid Act, 1981)

The concept of a magnet school was partly drawn from specialty schools in public education, such as the Bronx School of Science, Boston Latin School, and Chicago's Lane Tech. which have offered advanced programs to selected students for many years. Such specialty schools admit students by examination or other measures of performance or ability, and tend to serve highly gifted students. The idea of a magnet school, however, was to attract and enroll students based on their interest, not ability level, in either a particular subject or career (such as science, art, or business) or to attract students because of a different instructional approach (such as an open school). By attracting students with

common educational interests but diverse abilities and socioeconomic backgrounds, a magnet school could enroll a racially heterogeneous student body and provide a unique educational experience. Thus a magnet school program could improve the quality of education for a school district through diversity and also advance educational equity.

In the early 1970s the first magnet schools were developed in large urban districts seeking to reduce racial isolation in public schools through voluntary means, as an option to mandatory assignment. The federal government's funding for magnet schools began in 1976 under the Emergency School Aid Act (ESAA). This support had two kinds of effects. The magnet school became identified with district efforts toward desegregation, since the initial regulations required a magnet school plan that would reduce district racial isolation by at least five percent. This requirement tended to produce plans that included multiple, rather than single magnet schools, which had been the pattern with specialty schools and alternative schools (Raywid, 1985). The second effect of federal support was rapid growth of public interest in and involvement with magnet schools. In 1976, 14 districts applied for funding; by 1980, over 100 applied.

Magnet schools attracted support from local educators for several other reasons. A national study of magnet schools identified four major contributing factors to the growth of local interest in magnet schools (Blank, Dentler, Baltzell, & Chabotar, 1983):

1. Developing a voluntary approach to school desegregation;

2. Interest in educational options and diversity in curriculum offerings (such as advanced programs, arts, science, and foreign languages) and in school organization (such as alternative schools, open schools, traditional or basic education, and individualized instruction) with the objective of improving the overall quality of education in a district;

3. Greater attention to the outcomes from public education, including preparation of students for careers or preparation for decisions on further education or training;

4. Renewed concern with the quality of education on the part of community leaders, parents, and educators, as exemplified by the now well-known report of the National Commission on Excellence in Education, A Nation at Risk (1983).

As part of the 1983 study (Blank et al.), a survey was conducted with the 350 largest urban districts. The results showed that 138 districts, or more than one-third, had magnet schools; a total of over 1100 magnet schools. About half of the districts had received no federal magnet school funding. The mean number of students in magnet schools per district was 3100, with the range of district magnet enrollments varying from 125 to 25,000 students (K-12).

Since 1983, several developments have affected the initiation and expansion of magnet schools at the national, state, and local level. First, magnet schools continue to

have a major role in desegregation of urban districts in all regions of the country. After ESAA was merged into the state block grants (Chapter II of the Education Consolidation and Improvement Act of 1981), a new federal magnet school grants program for local school districts was authorized in 1984. The program currently supports about 40 district programs with total federal funding at $114 million for fiscal year 1989. In the 1980s, the Justice Department has consistently supported magnet school plans as solutions for districts under court order to reduce segregated schooling. It is likely that this federal role has spurred more districts toward magnet schools, as well as expanding the number of schools in existing programs.

Research findings have supported the role of magnet schools in desegregation. Early studies showed magnets were effective as part of mandatory assignment plans (Rossell, 1979; Royster et al., 1979). A recent longitudinal study by Rossell and Clarke (1987) showed that magnet schools improve racial balance in predominantly voluntary plans for desegregation and help to reduce "white flight." The study also found that desegregation plans using predominantly mandatory assignment help to desegregate schools, but that over time magnet school voluntary plans maintain higher rates of integration. Recently "controlled choice" plans for desegregating schools have been used in several urban areas, resulting in further attention focused on the role of magnet schools (Alves & Willie, 1987; Glenn, 1987; Rossell, 1987).

Since 1983, other important factors contributing to magnet school development have been the push for educational excellence as well as increased interest in school choice. More districts have recognized that the magnet school offers a strategy for improving educational quality through innovation in the organization of schooling and diversity of curriculum. Large and small urban districts, as well as states, have adapted the concept to provide students and parents with options for enrolling in schools with unique themes and programs.

However, as Metz (1986) has pointed out, while many magnet schools achieve the goals of expanding diversity and choice as well as increasing the heterogeneity of the school population, the model also brings the possibility of disparity in the quality of education between magnet schools and traditional neighborhood schools. Magnet schools could produce a bifurcation of public education into two tiers: special opportunities for selected students in a set of schools and lower-quality education for the remaining students in neighborhood schools (Moore & Davenport, 1989). Concern with the distribution of magnet school opportunities may increase as educators work to decrease high rates of dropping out in urban districts and as attention focuses on the "at-risk" student (CCSSO, 1987; U.S. Department of Education, 1987). Growing interest in extending educational choice beyond magnet schools within districts to choice of any school across districts (Boyd & Kerchner, 1988; Nathan, 1984; Raywid, 1985), raises questions about who benefits from choice, and the lessons that can be learned from the experience with magnet schools have become more important.

This synthesis is designed to address some of the current questions concerning the extent to which the quality of education is advanced through magnet schools. This paper focuses on public magnet high schools for several reasons. At the high school level,

magnets are more likely to be designed to focus on specific subject areas, an approach to education which departs from the common school model. In addition, high school students have greater mobility than younger students, thus creating more options for educational choice. Since magnet schools have been implemented primarily in and around big cities, the analysis will focus on magnet schools in urban education.

Three questions are examined in the paper:

- First, magnet schools appear to be an increasing method of public education, especially in urban school districts. What do we know about the scope of magnet high schools in public education? What types of students are served?

- A second question concerns outcomes of magnet schools. To what extent do magnet high schools advance student learning? What accounts for differences in the educational effectiveness of magnet high schools?

- Third, the paper examines existing research findings on overall effects of magnet high schools on education in a school district. Does education in non-magnet schools suffer when magnet schools thrive?

METHODOLOGY

To address the three research questions, several approaches for identifying and analyzing data were used. To analyze the first question on trends in magnet schools and enrollments, current data were collected from 15 urban districts that were part of the 1983 national study (Blank et al.). The 15 districts were originally selected to provide representation of the 138 urban districts with magnet schools in 1983, and several selection strata were used: district size, percent minority students, region, and number of secondary magnet schools. The 15 districts were re-contacted in February 1989 and asked to provide data on their magnet schools for the 1988-89 school year. The data are displayed in Table 1.

To analyze evidence on the second and third questions on magnet school effects on learning and on education in the district, two methods were used. Large urban districts with magnet schools were asked to submit district research and evaluation reports; these were compared across districts. The findings from the local studies were then compared with research evidence from the 1983 national study and other research on magnet schools.

Over the past decade, research on educational quality issues as they pertain to magnet schools has been dominated by analyses of program planning and implementation, often based on experience from one district (e.g., Barr, 1982; Bryant, 1987; Dentler & Scott, 1981; Hale & Maynard, 1987; Marshall, 1978; McMillan, 1980). Recent studies by Metz (1986), McNeil (1987), and Archbald (1988) examined the effects of district and school policies, organization, staffing, and school processes on education in magnet schools.

The 1983 national two-year study of magnet schools (Blank et al.) is one of the few studies to conduct a multi-district, comparative analysis of educational effects of magnet schools (also, see Levine & Eubanks, 1980, study of elementary magnets). A primary aim of the design and methodology for the two-year study of magnet schools was to determine the educational effects of magnet schools and identify the district and school factors that are related to positive magnet outcomes. The study was designed as a comparative study among magnet schools and districts, not as an analysis of magnet schools and non-magnets in the same district. Site visits to 15 selected districts and 45 magnet schools provided numerous interviews, observations in schools and classrooms, and collection of district and school statistics. The following variables were included in the study:

Outcomes: reading and mathematics achievement (magnet scores compared with district averages), graduation rate, attendance, transfers, and suspensions.

Policies: district policy commitment, policies on staffing and student transfer and assignment, magnet school location, quality of facilities, student selectivity, student and staff demographic characteristics, and magnet program objectives.

School organization: theme and structure of magnet; coherence of theme, staff and curriculum; principal leadership; and cost per pupil.

Education process: education quality scale (comprised of measures of instructional quality, curriculum, student-teacher interaction, student learning opportunities, and use of resources) and quality integration scale (comprised of measures of racial/ethnic integration of student body, classrooms, staff, and interaction patterns).

Multiple regression analysis was used with the data collected from the 15 districts to analyze the relationship of policy and organization variables to education process measures and to outcomes.

To obtain more recent data, in September 1988 the author contacted the research and evaluation directors for 33 large urban districts known to have magnet schools, requesting studies of magnet schools that had been conducted within the past three years. Responses were received from 21 of the districts after follow-up telephone calls. Several reports were only descriptive summaries; several included only data on desegregation progress, and some responses indicated that no reports were available. Twelve studies that contained data on educational outcomes of magnet schools were selected for further analysis (see Appendix for list of 12 districts). These 12 districts are probably not representative of all districts with magnet schools; rather they are likely to represent districts that have more well-developed research and evaluation operations and better research on magnet schools. The analysis and findings in this synthesis are based only on the data and information provided in the district reports. No interviews or follow-up calls were used to obtain additional information. Although some district reports included K-12 magnet schools, this synthesis focuses primarily on findings relevant to magnet high schools.

The 12 studies were systematically reviewed to identify measures and findings relevant to the research questions. Table 2 shows the types of measures identified

(education outcomes, student selection, organization and process, and district effects) and education outcomes findings and other measures/findings.

The district reports that were analyz ried widely in the proportion of magnet schools that are covered. For example, and Los Angeles included all their elementary, middle/junior, and high school magnet schools in the study and report. The New York City study examined four new magnet high schools, which include only one of the eight "options high schools" on a list provided by the district office and represent a small portion of all the city's high school options programs or schools (150 according to Blair, 1985). San Diego conducted separate evaluation studies for each magnet high school-- thus the study reviewed was for one of the 10 magnet high schools. To assist in comparing education outcomes across the 12 district studies, five possible "levels" of analysis were outlined:

Level 1: Use of measures of student outcomes, such as student achievement, attendance, dropout (graduation) rate, transfer rate, postsecondary education or employment

Level 2: Comparison of the student outcomes in magnet schools with outcomes of students in comparable non-magnet schools or district norms at the magnet school grade level.

Level 3: Analysis of outcomes of magnet schools over time, e.g. pre-post test, by tracking individual students.

Level 4: Analysis of outcomes of magnet schools controlling for student background, ability level, or criteria for magnet school selection.

Level 5: Analysis of outcomes of a magnet school relative to outcomes from a matched control group of students who chose to enroll in a magnet school but are currently on a waiting list (to control for the self-selection factor).

To compare the methods of magnet student selection, a "selectivity index" developed for the 1983 study was applied to the district studies. The index has five categories:

Highly selective: Combination of good grades, high test scores, teacher/counselor recommendations, good behavior record, interviews, and right to remand student to sending school;

Very selective: No high cut-off on test scores but combination of criteria above;

Moderately selective: C-average grades, good behavior, interview, and recommendation;

Somewhat selective: Interest, good behavior, and recommendation;

Non-selective: Interest, first-come-first-serve or lottery, no remands to sending school.

FINDINGS

What do we know about the scope of magnet schools and students enrolled?

The data on magnet schools and magnet school enrollments for 1982-83 and 1988-89, in Table 1, show that in 13 of the 15 districts the number of magnet schools and students has risen significantly. The mean district magnet enrollment in 1982-83 was 6,053; the mean for 1988-89 was 10,328. Sharp increases in magnet enrollment of 100 percent or more have been experienced in seven cities: Kankakee, Louisville, Memphis, New Haven, St. Paul, San Diego, and Seattle. Louisville's magnet enrollment has increased from 1,100 students to 8,400; St. Paul's has increased from 2,500 to over 8,000; and San Diego's has increased from 15,200 to over 31,300. The total magnet enrollment now comprises one-third or more of the total student enrollment in Buffalo, Cincinnati, Kankakee, St. Paul, San Diego, and Seattle.

The total number of magnet secondary schools has risen in the six year period. In the 15 districts, there are now 70 middle/junior high magnet schools and 77 senior high magnet schools, which is a significant increase from the total of 95 secondary magnet schools in 1982-83.

For the 1988-89 follow-up, data on senior high magnet schools and enrollments were collected separately. The percentage of senior high students in magnet schools was computed for each district by multiplying the total district enrollment by 31 percent (the average percentage of students in grades 9-12 in the U.S.) and dividing by the total magnet school enrollment. The percentages range from 7 percent in Pittsburgh to 43 percent in Kankakee. Eight of the 13 reporting districts have from 15 to 26 percent of senior high students in magnet schools, or an average of approximately 20 percent.

Five districts reported data on the number of applicants for magnet schools (generally at the entry grade for a school, such as ninth grade for high schools) and the number accepted. The rate of acceptance varied from about 25 percent of applicants in Buffalo and Pittsburgh to 40 percent of applicants in Cincinnati to 90 percent of applicants in Lubbock and St. Paul. These data indicate that some districts have much greater demand for magnet schools than can currently be delivered. It should be noted that Buffalo has not increased the number of magnet schools since 1983 and has a high number of applicants, indicating that popularity of the concept has remained high. Lubbock and St. Paul have recently expanded their magnet programs to more schools and most students who apply are accepted.

The information on student selection measures from the 12 district studies, shown in Table 2, provides an indication of change in methods of selecting students for magnet schools. Among the district studies that included information on student selection, three districts-- Austin, Dallas, and St. Paul-- have one or two "highly" or "very selective" magnet schools (e.g., gifted and talented schools). In Dallas all the other magnet schools are

non-selective (St. Paul did not report on the other magnets). Rochester and New York City secondary magnet schools are labeled "moderately selective," since both districts use a method of matching magnet selection with the distribution of student characteristics and test scores of the district. Thus, these districts intend to have a proportion of students in each magnet school selected according to prior achievement and a proportion that are not selected on prior achievement. All the magnet schools in the other districts that reported on student selection (Denver, Montgomery County, Pittsburgh) are listed as non-selective. If the magnet schools in the seven districts reporting selection criteria are compared to the group of 15 districts and 45 schools in the 1983 study, the numbers show there is a greater proportion of non-selective magnet schools now than in 1983. Among the 72 schools for which current selection criteria were reported, 14 schools could be categorized as "moderately," "very," or "highly selective." Of the 45 schools studied in 1983, 29 were moderately, very, or highly selective (6 highly selective, 7 very selective, 16 moderately, 11 somewhat, and 5 non-selective).

These figures show a possible trend. However, statistical comparisons are questionable since the sample of districts for 1988-89 is smaller and the rating of selectivity was taken from district reports, not constructed for each school from original interviews and observations as in the 1983 study. What can be noted is that districts which have increased the number of magnet schools tend to avoid using selection criteria that will label the school as selective or elitist. For example, magnet schools in San Diego, Los Angeles, and Prince George County (Maryland), all with rapidly increasing numbers of magnet schools, use no official selection criteria.

However, selection criteria for magnet schools give only a general indication of the characteristics of magnet students. Studies by Moore and Davenport (1989), Blair (1985), and Price (1985) have shown that, even without selection criteria, several factors operate in some urban districts to produce magnet school enrollments that show greater selection by higher achieving students than in non-magnet schools. First, there is competition for a limited number of seats. Second, magnet schools are often perceived by students, parents, and teachers as having been designed for better students. Third, limited dissemination of information and informal counseling works to favor the odds of better students applying to magnet schools. In addition, schools may not apply selection criteria consistently.

One way to analyze self-selection is to examine independent measures of student background and prior achievement for magnet school students and applicants. For example, data for the Dallas high school magnets, shown in Figure 1, lists the district average score and the average magnet school student scores on required ninth-grade state competency tests. The racial/ethnic composition of the district and the magnet high schools are also shown.

The test score data from Dallas magnet high schools show that the ninth-grade magnet school students in each school score much higher than the district averages. Since only one school, the talented and gifted magnet, has selective entrance requirements, these scores appear to indicate that the self-selection aspect of magnet schools tends to draw students who are achieving at a higher level than the average ninth-grade student.

The data on racial/ethnic composition in Dallas magnet high schools shows that half of the schools have a lower ratio of white to minority (black and Hispanic) students than the district ratio. The magnet schools also vary widely in the proportions of white and minority students in the various schools.

Another example of the self-selection factor is illustrated with data from the Houston study in Figure 2, which indicates the number of student applicants enrolled and number not accepted for magnet high schools by student race/ethnicity. This data shows that a lower percentage of white students that applied were accepted than the percentage of blacks or Hispanics. It is likely that these proportions reflect district efforts to meet racial/ethnic goals for school desegregation. Even so, the proportion of whites in high school magnets (27%) is higher than the proportion of whites in the district. Overall, 88 percent of the students who applied were accepted in the 15 magnet high schools, which shows that the district has made a strong policy commitment to magnet schools and is serving a high proportion of interested students.

The data from the Houston report provide a comparison of magnet enrollment and rates of non-acceptance by race. It would also be useful to examine the prior student achievement of students who were enrolled in magnets versus those not accepted. The large number of magnet schools in Houston indicates district responsiveness to growing interest, but an important policy question with expanding programs -- and all magnet school programs -- is whether students and parents have equal access to information about magnets and equal opportunity to apply and enroll.

To what extent do magnet high schools advance student learning? What accounts for differences in the educational effectiveness of magnet high schools?

The findings of the 1983 national study (Blank et al.) showed that 80 percent of the magnet schools had average reading and math achievement scores above their district's average. School test score averages for reading and mathematics were compared by identifying the difference between each magnet school average score and the district average, and then analyzing the differences across schools and districts. In reading, 44 percent of the magnet scores were at least a grade level above the district, and in math 41 percent of magnet scores were at least a grade level higher. Since the study did not include non-magnet schools, it was not possible to compare magnet scores with scores for comparable non-magnet students or schools.

After an initial review of the Education Outcomes Measures in the 12 district studies (Table 2), it was determined that no statistical comparisons of outcomes across the studies, or comparisons with a national standard, would be possible. However, the Education Outcomes Findings can be compared to determine patterns in the findings. To help in analyzing and interpreting the measures and findings on education outcomes, the matrix in Figure 3 displays each study by the "levels" of outcomes analysis that are possible with the study's measures and data.

Ten of the district studies reported average magnet school test scores for one year and compared the scores with non-magnet schools or district averages (minimum of levels

1 and 2). This limited cross-section comparison generally showed that magnet school scores are higher. For example, the average reading score for ninth-grade students in Houston's 15 high school magnets (on MAT, in grade-level equivalent) was 12.5 while the district average was 8.0; the average magnet math score was 12.0 while the district average was 9.4. The Los Angeles study showed that the average tenth-grade mean percentile (on CTBS) in reading for magnet school students was 58 while the district average was 32; the average magnet percentile in math was 74 while the district average was 45.

Eight of the district studies measured outcomes over time, usually from one year to the next (level 3). The inclusion of outcome measures at more than one point in time allows us to determine the extent of improvement in magnet outcomes, as compared to improvement in outcomes for non-magnet schools or the district average. Thus, it is possible to analyze change that can be attributed to students' time spent in a magnet program. For example, the Pittsburgh study showed that among six magnet high schools the average percentile score in reading (on CAT) increased 6.7 points from 1986 to 1987, while the district average increased 4 points (49 to 53). In language, the average magnet school percentile score increased 8.5 points, while the district average increased 7 points (62 to 69).

However, it is preferable to measure change in student outcomes with data at the individual student level. The data on Pittsburgh magnets need to be considered with caution since school average scores are compared from one year to the next, and data are not provided to determine whether the same students are being tested. This problem is accentuated with analyses of change over longer periods of time. For example, the New York State study examined differences in scores for magnets versus non-magnets over a ten-year period and found positive, but small, increases in magnet school scores. Since the extent of change in the student composition of the schools is not taken into account, it is very difficult to draw any conclusions about magnet effects from the study. The St. Paul study shows magnet schools provided positive improvement in outcomes using pre-post tests; plus, in this study the same students were tested at both times.

Four district studies (Austin, Dallas, Montgomery County, and San Diego) analyzed the extent of improvement in outcomes over time for individual students and used statistical controls for student background characteristics (i.e., analysis level 4). The findings show positive effects of magnet schools on test scores, and with these results a school effect can be stated with some certainty since comparisons are based on equivalent groups of students. The Austin, Montgomery County, Dallas, and San Diego studies compared magnet and non-magnet student scores, controlling for scores at entry to the magnet schools (i.e., pre-test versus post-test scores).

Accounting for student background makes it possible to determine more specifically which students, subjects, and grade levels are affected by the magnet program. The Montgomery County study (of elementary magnet schools) found higher increases in reading and math achievement scores for magnet students than non-magnet students for grades 1-6, but the largest gains attributable to the magnet program were in grades 4-6 when the students had been in the program longer. Magnet transfer students in grades 4-6 had

slightly higher scores than magnet non-transfer students (a statistical control group for students transferring to the magnet--i.e., level 5).

The Austin study found significantly higher scores for magnet students, as compared to comparable non-magnet students, in the subjects of science and math in grades 9, 10, and 11. For example, in math the ninth grade magnet pre-post average scores improved from 10.67 to 14.73, or .44 grade level equivalent higher than the average non-magnet score; in science the ninth grade magnet pre-post average scores improved from 11.26 to 14.76, or .43 higher than the average non-magnet score. The theme of the Austin high school magnet is science.

The San Diego study found no difference between high school magnet and non-magnet scores on the measure of critical thinking but significant gains were found in the magnet scores on the measure of writing, which is a theme of the magnet school that was studied. Thus, the evidence from this small sample of districts and schools with more complex research models shows positive educational effects of magnet schools and also that the effects vary by grade level and subject area.

Many of the studies used other outcomes measures in addition to achievement test scores, such as attendance, student attitudes, and preparation for college. The studies that compared magnet high school student attendance with district averages, e.g., Rochester and New York City, generally found higher attendance at magnets. However, these results were based on analyses that included no other variables in the model, such as student selection or comparison schools. Pittsburgh examined high school attendance over time and found little improvement in the magnet schools.

All eight district studies that included attitude measures found positive student attitudes toward magnet schools and satisfaction among magnet students about their education. Given the voluntary nature of magnet schools, positive attitudes would be predicted. Many of the analyses were based on only one or two dimensions of attitudes and a small number of items, and typically the results were not compared with attitudes of non-magnet students or parents. The Los Angeles study design included five dimensions of attitudes; comparisons were made with non-magnet schools. Although the findings showed variation in student attitudes by dimension and across different magnet schools, attitudes of magnet school students were overall more positive about their education than students in non-magnet schools.

The 1983 national study was designed to provide detailed analysis of the effect of differences among magnet schools on student outcomes. One measure was a scale of "quality education processes" in the magnet school. A comparative analysis using scale scores showed that one-third of the magnet schools (15 of 45) were rated as having "high education quality" on all five dimensions in the scale (a rating over 75 on a scale of 100).

The 1983 study also showed that three magnet school policy and organization variables were significantly related to quality of education processes and outcomes (with statistical controls for factors such as student characteristics and school resources): a) principal leadership, b) coherence between the magnet theme and the curriculum and

staffing, and c) district policy commitment and flexibility with procedures. The "coherence" variable measured whether the magnet school actually delivered what it advertised, that is to what degree the school offered any unique, quality elements in its curriculum and program. This kind of measure would be very appropriate for addressing concerns about education effects that have been raised in the debate about broader programs of choice.

Several of the 12 district studies included descriptions of magnet programs, such as theme, curriculum, and unique elements. Such descriptions help to identify important qualitative aspects of magnet programs to supplement quantitative indicators of input and output, such as enrollments, attendance, and test scores. The kind of short descriptions provided in the Dallas, New York City, Pittsburgh, and Rochester reports (approximately a half-page per school) provide a picture of the programs, but not enough detail to explain differences in outcomes.

A qualitative program description can serve as part of a formative evaluation design of the implementation of magnet schools and the quality of curriculum and instruction. The San Diego study is an example of a detailed formative evaluation using a case study design, including program descriptions as well as process measures such as the number of teachers using specific curriculum and instructional practices designed for the magnet program. Through comparison of the magnet school findings with a similar non-magnet school, the study is able to show the extent to which the implementation of the magnet curriculum design in the classroom affects student outcomes, and the results show that the magnet program does produce positive results.

Other recent research has examined, in detail, the effects of organization and process variables in magnet schools. Metz's (1986) detailed ethnographic study of magnet schools in one district produced a very useful analysis of the effect of district design and implementation of a magnet program, showing, for example, that top-down implementation by the district can be detrimental to development of a positive school climate, and that "faculty culture" can be an important factor in producing an innovative, effective magnet school. McNeil's (1987) study of teachers in magnet schools in one urban district showed the very positive effects of teachers having a role in planning and developing a magnet school as well as the benefits magnet schools bring to teacher morale and career rejuvenation.

Archbald (1988) analyzed differences between Milwaukee's magnet schools and traditional schools in the teachers' views of school conditions, or "organization environment," and found that magnets were viewed more positively by teachers due mainly to high parent interest and involvement as well as more school autonomy from district regulations. His study also examined the factors related to parent and student choice of magnet schools for whites and minorities, including socioeconomic status, available information, theme, and location, finding that location and distinctiveness of magnet theme were important factors. Witte and Walsh (1989) conducted a detailed analysis of differences in student outcomes among Milwaukee schools using an effective schools model, and found that after taking into account other programmatic variables magnet schools had significantly better outcomes than non-magnet schools.

What are the overall effects of magnets on education in a school district? Does education in non-magnet schools suffer when magnet schools thrive?

The 12 district studies provided some evidence on a key indicator of district effects, i.e., distribution of magnet opportunities in the district. For example, Dallas, Rochester, and Pittsburgh report the racial/ethnic characteristics of magnet students as compared to district averages. The studies show that the great majority of magnet high schools are representative of the racial/ethnic distribution of students in the districts. As described above, the Houston study goes further by reporting racial/ethnic composition by school and is able to report the number of students not accepted by providing the number of applicants per school.

Other research provides more detailed analysis of the distribution of magnet opportunities. Moore and Davenport (1989) analyzed the characteristics of students enrolled in magnet high schools and other schools of choice in four big-city districts and found that very few at-risk students were enrolled while the traditional high schools in the four districts typically enroll a high proportion of at-risk students. Archbald's (1988) study provides a multi-variate model for analyzing magnet school enrollments and factors determining which school students and parents select.

Two district studies analyzed the pattern of student transfers to magnet schools. Dallas listed the number of students drawn from each "home" school to the magnet schools. The data show that all but one magnet high school draws students from attendance areas of all 20 high schools in the district. The attendance areas for three schools provide over a third of the 2800 students in magnet high schools. Austin reported the number of honors students drawn from each of the high schools in the district to the magnet high school, with the number varying from 2 to 17 percent of each school's honors students. This type of measure shows the broader effects of a magnet school on non-magnet schools; information that has the potential for use by decision-makers in determining the relative benefits and costs to the district schools from the redistribution of students caused by magnet programs.

The Houston study reported per pupil expenditures for each magnet school. For magnet high schools, the extra cost varies by school from $400 to $1300 per pupil. An important factor is the number of students in the magnet school or program. Magnets with more students have lower per pupil costs. The report clearly shows the differential costs of operating some magnet schools as opposed to others, although a cost-benefit analysis would need to examine various measures of outcomes and the benefit of offering unique magnet program opportunities.

The Rochester study indicated that for the 1988-89 school year the district offered school choice for all students in grades 6-12. The interest generated by magnet schools, and the opportunities perceived in the choice of a school or the diversity of program offerings, caused the district to open all non-magnet schools to voluntary choice. More study will be needed to determine whether the opportunities produce gains in learning.

SUMMARY AND IMPLICATIONS

One finding from this analysis is that magnet schools are playing a larger role in urban education than they were six years ago. The average urban district with magnet school programs has over 50 percent more students in magnet schools than in 1983, with the average district enrollment in magnet schools in 1989 at 10,300 students. At the high school level, about 20 percent of students are in magnet schools in the average urban district.

A second finding concerns the characteristics of students who are served by magnet schools. Two aspects of this issue were examined: magnet selectivity based on prior student achievement and the rate of applications and acceptance in magnet schools.

Selective academic criteria may be used in a lower proportion of magnet schools now than in 1983 when a national study examined student selection standards. The review showed that less than one-fourth of magnet schools in seven districts reporting selection information use any criteria for student selection based on prior academic performance. However, in magnet schools that are "non-selective" the self-selection of students through voluntary enrollment tends to produce an entering student group with better academic achievement than the district average.

The number of magnet students has risen sharply over the past six years but the demand to be enrolled in magnets has also increased. The rate at which applicants are actually accepted by magnets varies greatly by district, from districts that accept 25 percent of applicants to some that accept over 90 percent. The popularity and quality of magnet schools in districts affect the rate of applications and acceptance, but the rate of acceptance is also affected by the growth in number of magnet schools and the student selection criteria set by the district, such as race/ethnicity and prior academic achievement. To examine the issue of who is served in greater detail, analyses are needed of the socioeconomic background and prior achievement of magnet students and applicants.

Do magnets schools improve student outcomes? Studies with more complex research models indicate that magnet schools have positive effects on outcomes. Virtually all the studies reviewed show that average test scores of students in magnet schools are higher than scores for non-magnet schools. However, some studies do not account for student background and prior achievement. The findings of studies that measure change in magnet student scores over time and compare magnet student scores with those for similar non-magnet students showed that magnet schools improve student outcomes, but the strongest effects on achievement are in specific subjects and the size of magnet effects vary by school and by grade.

The 12 local district studies that were reviewed show that educational effects of magnet schools can be determined. Some of the studies are able to demonstrate effects with greater certainty than shown in the 1983 national study. Several of the local studies

provided detailed statistical comparisons with similar students in non-magnet schools, and some of the studies examined the extent of change in outcomes of magnet schools over time.

However, major findings of the 1983 study, such as the effects on students of differences in how magnet schools are designed, supported, and organized, were not examined in the 12 local district studies. Without measures of school organization and process, the important question of whether and how magnet school education is different and unique cannot be answered. The San Diego model for magnet school research and evaluation does include measures of school organization and process as well as outcomes, and therefore can assess the degree to which magnet programs actually change curriculum, instruction, and teacher-student interaction. The findings based on this model would be extremely useful in planning, implementing, and improving magnet schools. Since magnet schools are becoming an important tool of school improvement and school restructuring efforts, organization and process studies could determine the extent to which magnet schools advance characteristics such as instructional leadership, teacher efficacy, site-based management, staff development, curriculum reform, and parent involvement.

This synthesis produced only limited findings on the important policy issue of the overall effects of magnet schools on education in a school district. Important related topics include distribution of opportunities, allocation of resources, student and staff morale, and overall change in education outcomes. The data show that magnet schools are producing an increased demand for more magnet schools. Some districts, such as Houston, San Diego, and St. Paul have expanded the size of magnet programs significantly. Other districts such as Buffalo, Cincinnati, and Pittsburgh have low rates of acceptance and the total magnet enrollments show small increases over six years. While most magnet schools are not academically selective, it appears that most magnet schools serve students who are not "at-risk" in terms of academic problems. To fully examine distribution of opportunities, data are needed on the student background and prior achievement of those accepted to magnets and those on waiting lists.

The costs of magnet schools were generally not revealed in the research reports, although the Houston study did show that magnet schools have higher costs than non-magnet schools and that the amount of extra cost varies among magnet schools at the same grade level. The cost of magnet schools could be explained with analysis of cost and outcomes, i.e., magnet schools' "return on investment," as well as with additional data on student characteristics, to determine who benefits from the additional costs.

The general question of whether improved outcomes of magnet schools comes at the expense of reduced effectiveness in non-magnet schools was not directly addressed by the district studies. This kind of analysis requires tracking student transfers and analyzing trends in education outcomes over time in magnet and non-magnet schools. The studies of Austin and Dallas magnets included analyses of student transfer patterns and showed potential for district effects studies using individual student data analyzed over time.

Policy Implications of Findings. National and state education policies may have increased the push for magnet schools and choice, but it is still the case that most policy

decisions to implement magnet programs are made by decision-makers in large, urban school systems. From the perspective of urban school decision-makers (including board members, administrators, principals, and community and teacher leaders), the magnet school is likely to continue to be viewed as a primary method of educational innovation.

The findings from this synthesis are relevant to at least three policy issues currently facing urban educators that sustain continued high interest in magnet schools:

(a) Need for the urban district to respond to demands from parents and community leaders for improved education quality, and opportunities for diversity and choice;

(b) Increased demand for the district to design and implement education innovations to reduce the risks for potential dropouts;

(c) Continuing concern with how the district can provide for equal opportunity as defined by expected levels of racial balance in schools.

The magnet school is a promising, utilitarian approach to complex problems for which other approaches have been tried. Like other innovations in education, hopes for this model have risen as it has been implemented and found some initial success. For example, the American comprehensive high school is an example of an innovation upon which so many demands have been placed that the model may have lost its original value (Boyer, 1983; Powell et al., 1985). Expectations for magnet schools have risen sharply and there is pressure to continue to expand them so that more schools and students will be included.

The magnet school arose as a practical solution to local school leaders' efforts to meet goals for school desegregation while at the same time trying to reduce the conflict and the draining effect on education that have often accompanied mandatory assignment plans. As school districts experimented with magnet schools they found strong interest from parents and students. Now urban educators are asking whether magnet schools should not be more broadly used to try to improve education for at-risk students. As education decision-makers try to address the continuing high rates of dropouts, they are trying to find models and solutions to the problem.

Few, if any, magnet schools were conceived as a major solution for the problems of at-risk students. In fact, magnet schools have often been viewed as a program to retain middle-class students. The original concept of a magnet school was aimed at serving a heterogeneous student body, and there is some evidence that magnet schools can improve education for lower-achieving students (Metz, 1986). If magnet schools tend to best serve students who seek the opportunity, as the findings suggest, thus leaving out most at-risk students (Moore & Davenport, 1989), then urban districts may need to question the feasibility of magnet schools as a solution to the dropout problem or revise their methods of administering magnet programs.

Education decision-makers also must weigh the benefits of magnet schools against the effects of a magnet on the district as a whole. One of the questions about magnet schools as a large-scale strategy for education improvement is the cost, and in particular the cost relative to who benefits and the degree to which other schools and programs suffer (Moore & Davenport, 1989). Like other innovations in education, the magnet school concept may have gained interest and support more quickly than recognition of the costs. Decision-makers eventually will want to know whether district costs of magnets are justified in terms of improvement in education outcomes relative to overall performance of students in the district. Since magnets are designed to offer unique opportunities and diversity in programs, it is difficult to perform cost-benefit comparisons of magnets and other schools. Methods of evaluation that account for unique education objectives of magnet schools will need to be developed.

After magnet schools are implemented, decisions must be made about program continuation and expansion. Districts that have had initial success with magnet schools quickly find a "second wave" of interest from parents, teachers, and neighborhood schools which needs to be considered, possibly through adapting the initial magnet school plan. Long lists of applicants and waiting lists could be a positive sign of interest in magnet schools, but they present problems in how students will be selected and whether programs should be expanded to meet the level of interest.

To maintain the intent of magnets to serve a heterogeneous student body, and to deter growth of a two-tier system of public education, fair and effective methods of information dissemination, recruitment, and selection need to be found (Blank, 1986; Hale & Maynard, 1987). For example, Cambridge (Massachusetts) established "parent information centers" in schools, shopping centers, workplaces, and apartment buildings to ensure that all students and parents would have more equal access to magnet school information (Peterkin & Jones, 1989). Opportunities for teachers and parents to be involved in planning and developing magnet schools also need to be structured and in place (Blank, 1988; Bryant, 1987). High school magnets need to be planned so that the curriculum themes and strategies for student recruitment and selection are consistent with a district's goal for the types of students to be served.

As magnet schools expand, district administrators have found they need to adapt or shift some magnet schools or change the method of selecting students. Frey et al. (in press) outlined the many changes that San Diego's large magnet school system has undergone in order to continue to meet the varied community interests, and Murphy (1987) described changes in Prince George County's (Maryland) recruitment and selection procedures for magnet schools. Districts may consider making all schools magnet schools, such as in the Cambridge controlled-choice plan, East Harlem elementary schools, and Kansas City secondary schools.

The issue of magnet schools' selectivity continues to be important even though selective academic standards may be used with a smaller proportion of magnets than six years ago. The data from the follow-up survey with 15 districts showed that the proportion of students that applied who are accepted in magnet schools varied from 25 percent (Buffalo) to 90 percent (Lubbock and St. Paul). The extent to which magnet schools are

"over-subscribed" can provide political leverage to increase the number of magnet schools, but it can also increase frustration about limited opportunities for what is viewed as a quality education option. A much larger pool of applicants than available seats in magnet schools can become a major issue, particularly if the rejected students are predominantly from one population sub-group, either minority or white, or low-income or middle class.

The question of student selection and opportunities for magnet schools has generated extensive debate in some districts, such as New York City. Two studies of New York magnet high schools (Blair, 1985; Price, 1985) showed that there is "intense competition" for the 31,000 seats in the 150 "options" programs and schools (Blair, 1985). In 1984, 91,000 students applied; the rate of acceptance was 38 percent. The ten most popular programs generated 77,000 applications and the rate of acceptance in these programs was 20 percent. Many of the magnet programs are designed to select a distribution of students with achievement scores similar to the district distribution. However, the students actually enrolled often had higher average levels of achievement than in the typical non-magnet school, at least partly due to varying use of standards and procedures from school to school and flexibility in the selection formula. Districts like New York will need to balance interests in school-level flexibility and autonomy with interests in access and opportunity for more students.

It is likely that the current issues and problems in public education, particularly in urban districts, will lead decision-makers toward magnet schools because of the apparent potential of the model as an innovation that meets several kinds of interests and needs. The high interest in magnet schools and broader forms of choice may, at least temporarily, constrain the efforts of researchers and evaluators to address difficult research questions about educational effectiveness. But, as program expansion continues and costs rise, there will be greater need for research that involves more complex analyses of educational effects and the relationship of outcomes to magnet school policies, organization, and processes.

Research Implications. The analysis of 12 district studies of magnet schools provided useful findings on education effects, and indicated areas in which local districts might improve research designs and use of student and school data, such as models involving analysis of magnet school organization and processes and multiple measures of outcomes.

For many districts, there are two kinds of obstacles to conducting evaluation research with a more complex research model: first, many of the studies are carried out and funded through federal grants for magnet schools with limited local funds, which tends to constrain the scope of the study questions, the number of schools, and the time available to conduct the research. Second, some school districts do not want answers to questions that are not viewed as appropriate given the district's objectives for the program. For example, interest in assessing the educational effects of magnet schools may be less in a district that has its primary policy commitment to magnet schools as a method of desegregation. Also, the politics of urban districts may yield strong reasons to exercise caution about the kinds of standards upon which magnet schools are evaluated. As magnet schools gain strong support for reasons of desegregation, choice, and diversity, a detailed

research analysis of education effects may not be viewed by decision-makers as addressing their current priority concerns.

Research on magnet schools should have several measures of student outcomes, even though student achievement test scores are most commonly available and used for analyzing outcomes of magnet schools. Some researchers observe that a standardized achievement test is not a valid measure of student performance for a magnet school, since it typically has objectives that focus on a special theme or curriculum which offers enriched or advanced experiences (Gaines, 1987; Tomblin, 1988). There is also an argument for using affective measures such as student, parent, and teacher attitudes toward the magnet school. Magnet schools could be expected to produce positive opinions of the quality of education being provided because of voluntary enrollment. Thus, the degree to which attitudes change is an important measure of magnet school effectiveness.

Given that magnet schools are designed to offer diversity in curriculum and school organization, magnet schools may need to have unique measures that are appropriate to their objectives. However, decision-makers are also likely to want some basis for comparing magnet schools to traditional schools.

The need for comparative research on educational effects of magnet schools using more complex models presents an argument for better district research, but, it also argues for large-scale, national- and state-supported research and data collection on magnet schools. One new source of national data on magnet schools will be the National Education Longitudinal Study (NELS), which was initiated in 1988 by the National Center for Education Statistics. When data become available, researchers will have access to nationally representative data on student achievement, student characteristics, teachers, and schools, beginning with students in the eighth grade and then follow-up data on the same students every two years. The NELS does include designation of magnet schools, and it will be possible to analyze the educational effects of magnet schools relative to educational outcomes for comparable non-magnet students as well as to study the effects of school organization and process variables.

The synthesis findings suggest that an ideal model for assessing educational effects would have the following components:

Capacity to measure multiple outcomes for the same students over time and to compare the outcomes with comparable non-magnet students, and preferably with outcomes measures appropriate to magnet school objectives;

Capacity to determine the relationship of organization and process variables to outcomes, particularly leadership, staffing, coherence of theme with curriculum and organization, and district policies.

Capacity to determine effects of magnet schools on the district, especially by assessing distribution of magnet opportunities, relative costs and benefits, student and teacher attitudes, and change in non magnet outcomes.

Every study of magnet schools may not be able to implement all elements of this model. Researchers working at local, state, or national levels should be cognizant of the kinds of measures and analyses that are needed to determine the educational effects of magnet schools.

Several of the district studies reviewed for this synthesis exemplified some aspects of the ideal model, such as measuring outcomes (Austin, Montgomery) and case studies of organization and process effects (San Diego). San Diego's study has a well-conceived plan for using quantified data, such as achievement tests that reflect the magnet objectives (e.g., a test of writing skills), as well as on-site interviews and classroom observation for analysis of magnet organization and processes. The case study approach is effective in identifying reasons for change in educational outcomes which can be attributed to the specific magnet school. However, a single-school case study does not provide analysis of different effects among magnet schools. Without comparative analysis, information is not provided on the extent to which there is commonality in design, organization, and instruction among magnet schools.

The Austin study included student background variables in the model which allow statistical controls for determining any "program effects" of the magnet school. The research design included detailed analysis of the performance of magnet students and comparable non-magnet students, and traced their education progress over time. The achievement levels of students entering the magnet school were matched with students at the same achievement level in non-magnet schools, and test scores of both groups were compared in subsequent years of high school. The Austin study also compared outcomes and progress for white, Hispanic, and black students, and analyzed differences in test scores by subject area. The results showed that magnet improvements were greatest in science and math, the magnet theme, for all three racial/ethnic groups. A weakness of the Austin model is the lack of any specific measures of magnet school policy, organization, and process variables that might explain magnet program effects. If these measures were included, the results would be more useful for planning and program decisions.

Research that has compared the educational effectiveness of magnet schools (Blank et al., 1983) has shown that magnet schools differ greatly in the degree to which they improve the quality of education. Magnet schools can be viewed as part of a larger district strategy for school improvement. Therefore, research is needed to document the effects of specific elements of change through magnet schools such as site-based management, curriculum revision, or teacher efficacy. Research on magnet schools should be designed to capture what explains differences in education outcomes and what effects magnet school programs have on education in non-magnet schools.

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APPENDIX

12 District Studies

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TABLE 1
ENROLLMENT TRENDS IN MAGNET SCHOOLS: 1982-83 TO 1988-89

	1982-83				1988-1989								
District	District Enrollment	Number of Magnets Elem.	Sec.	Total Magnet Enrollment	District Enrollment	Number of Magnets Elem.	Mid./Jr.	Sr. High	Total Magnet Enrollment	Sr. High Magnet Enrollment	% of Sr. High	Total Applicants to Magnets	Total Applicants Accepted
Augusta, GA	31,375	1	2	1,121	32,000	1	0	2	1,442	1,262	12%	NA	NA
Birmingham	44,717	9	4	7,548	43,169	5	5	6	8,776	5,233	39%	NA	NA
Buffalo	46,757	11	11	17,542	46,284	9	5	9	15,679	3,855	26%	8,541	2,287
Cincinnati	51,722	27	12	15,000	52,000	39	9	5	17,706	3,381	21%	16,801	6,758
Kankakee	5,932	0	3	1,031	5,600	7	5	3	2,395	750	43%	NA	NA
Louisville	31,375	1	2	1,121	98,276	3	3	8	8,400	4,575	15%	NA	NA
Lubbock	29,141	1	3	3,075	29,174	4	2	1	5,336	1,602	17%	3,565	3,500
Memphis	107,221	9	11	6,000	104,743	9	6	6	11,500	NA	NA	NA	NA
New Haven	17,154	13	7	537	17,016	1	1	4	1,947	NA	NA	NA	NA
Passadena	22,531	2	2	3,038	21,535	1	0	1	2,336	1,675	25%	NA	NA
Pittsburgh	41,855	13	7	4,500	39,549	46	6	9	6,717	933	7%	4,996	1,154
St Paul	31,276	3	2	2,586	33,472	14	6	5	11,961	2,282	22%	2,079	1,872
San Diego	109,808	7	15	15,200	116,371	31	4	10	31,359	8,950	25%	NA	NA
Seattle	44,795	47	11	8,000	43,023	69	15	5	21,933*	5,205	40%	NA	NA
Shreveport	46,310	5	2	4,502	52,435	5	5	5	8,726	2,529	16%	NA	NA

*Data from 1987-1988 report, includes approximately 3,000 students in two programs within a school

TABLE 2
ANALYSIS OF MEASURES AND FINDINGS ON EDUCATIONAL EFFECTS
FROM 12 DISTRICT STUDIES OF MAGNET SCHOOLS

District Study Year	Schools Studied by Level	Education Outcomes Measure	Student Selection Measure	Organization/ Process Measure	District Effects Measure	Education Outcomes Findings	Other Measures/ Findings
Austin 1987-88	1 Jr. High School 1 High School	Levels 1,2,3,4 ITBS/TAP reading, math, science (controls for pre-test score,match w/ non-magnet score) Attendance, disciplinary action (jr high) Student attitudes	Moderate Selective for jr high school Very Selective for high school	Teacher attitudes on program strengths and weaknesses (magnet teachers)	Number enrolled vs. applicants (164 vs 256, high school) Number of honors students drawn from other 8 high schools (varies from 2% to 17%)	Student test score gains higher than non-magnet math, science grades 9,10,11 e g , Magnet gr. 9, math increase 10 67 to 14.73, science 11 26 to 14 76 Student attitudes highly positive (no comparison schools)	Teacher attitudes improved by magnets
Dallas 1987-88	5 Elementary 7 Jr. High Schools 7 High Schools	Levels 1,2,4 (math with non-magnets on 8th grade scores) State comp. tests: reading, math, writing District "Essential Elements" test English, math, science, social studies Student attitudes (magnet schools)	"Academically Gifted" for gifted/ talented magnet, others non-selective (by interest)	Program & curriculum descriptions Teacher attitudes toward magnet (magnet teachers)	Students (race/ethnicity, gender) and staff (age, degree, race, gender) compared to district average Magnet enrollment trends for 6 years Analysis of home schools of magnet students	Magnet's average test scores (ITBS) higher than non-magnets at gr 9 (English 68, math 68 vs. 63, 59), No difference gr 11 (English 63, math 49 vs 61, 50)	Parent factors influencing student choice of magnet vs. traditional high school ("location" top factor)
Denver 1986-87	3 Elementary 3 High Schools (within school programs)	Levels 1,3 Stand test scores, pre-post during year Student Attendance (elementary)	Non-Selective (by interest)	Description of programs, staff characteristics, curriculum Analysis of programs' unique elements Analysis of objectives vs implementation and effects on high schools	No measure reported	No test average computed	Measures other than test scores recommended to assess unique curriculum objectives of magnets

District Study Year	Schools Studied by Level	Education Outcomes Measure	Student Selection Measure	Organization/ Process Measure	District Effects Measure	Education Outcomes Findings	Other Measures/ Findings
Houston 1986-87 Annual report for court order on desegregation plan	42 Elementary 14 Middle 15 High Schools	Levels 1,2 (District average) Reading, math stand. tests (grade 9) Reading, math, writing state competency tests (grades 9,11)	No measure reported	Class size Pupil/teacher ratio Teacher experience	Number on waiting list & applicants per magnet by race/ethnicity Per pupil expenditure	Magnet avg test scores (MAT) 15 high schools, grade 9: reading 12.5, math 12.0 District avg.: reading 8.0, math 9.4	None reported
Los Angeles 1986-87	54 Elementary, Middle, High schools	Levels 1,2 Reading, math stand tests magnets vs. non-magnet integration programs & district average (gifted programs analyzed separately) Student survey on preparation for college compare with integration programs Student attitudes toward school	No measure reported	Teacher survey on academic standards (compared with non-magnet) Principal survey on hiring standards for teachers Interviews with sample of magnet leavers attitudes toward magnets	No measure reported	Magnet avg test scores (CTBS) higher at all grade levels, e.g., magnet 10th gr reading 58th percentile, math 74th percentile Dist avg : 32nd percentile, 45th percentile	Slightly more positive attitudes of magnet high school students Magnet teachers higher expectations and teachers generally perceive students meeting standards
Montgomery County, Md. 1983-86	14 Elementary	Levels 1,2,3,4,5 Criterion-referenced reading, math tests, student scores analyzed over 4-year period and compared with non-magnets and non-transfers Student attitudes toward school	Improve racial balance Non-Selective	Survey of teacher expectations (magnets) Survey of parent satisfaction (adjusted by test scores), magnets vs. non-magnets by race Survey of student interaction, friendship	No measure reported	Gr 4-6 magnet students gains on reading, math scores .3 s.d. units higher than non-magnets Gr 1-3 no difference in gains Magnet student attitudes more positive, higher for transfers to magnets	Teacher expectations same for all grades Student rate of interracial friendships about equal (60-70%)

District Study Year	Schools Studied by Level	Education Outcomes Measure	Student Selection Measure	Organization/ Process Measure	District Effects Measure	Education Outcomes Findings	Other Measures/ Findings
New York State 1983-84	41 Elementary & Secondary school in 8 districts	Levels 1,2,3 Change in reading, math stand. test scores for gr 3 & 6 over 10 years, compare with non-magnets and district averages 1983-84 school test scores by percent minority	No measure reported	Principal goals survey Curricular themes by school Parent survey, teacher survey (magnets only) Teacher characteristics, turnover rate by pre/ post magnet	No measure reported	Elementary magnets scores (PEP) reading, math avg. increase 15 points 1977-81, Dist increase avg. 10 points No difference in magnet scores vs district average related to % minority students 35 of 39 magnets higher attendance than district average 7 of 11 high schools lower drop-out rate than district average	High satisfaction of parents and teachers in magnets
New York City 1987-1988	4 High schools (new magnets in 1987-88, 9th grades only)	Levels 1,2 Average attendance. magnets compared to district average Student attitudes toward programs and peers Promotion to next grade magnets compared to district average	District requires set percents with high, average, low test scores·Moderately Selective	Program descriptions	No measure reported	3 of 4 magnets higher attendance (avg. 87%) than district avg (74%) Average 69% students positive toward magnets 3 of 4 schools above 70% grade promotion standard	None reported
Pittsburgh 1985-86 1986-87 (2 reports)	10 Elementary 6 Middle schools 6 High schools	Levels 1,2,3 CAT for reading language, math Attendance	First-come, first-served at entry grade level of each program; improve racial balance Non-Selective	No measure reported	2 Elementary schools added due to interest	6 magnet high schools percentile scores (CAT) avg increase 1986 to 1987 reading 6.7 points, language 8 5 points; Dist avg increase 4 points. 7 points	Oral proficiency interview and rating for foreign language magnets

District Study Year	Schools Studied by Level	Education Outcomes Measure	Student Selection Measure	Organization/ Process Measure	District Effects Measure	Education Outcomes Findings	Other Measures/ Findings
Rochester 1987-88	8 Secondary schools (4 within school)	Levels 1,2,3 Stand. test reading, math compared with non-magnets (within school programs) Attendance Drop-out rate; suspensions College plans, % students	Student essay, maintain magnet racial balance & academic balance (test score avg. similar to district): Moderate Selective	Program descriptions' unique elements, recognition	1988-89 School choice expanded to all students Student race/ethnicity by district average	Mixed trends on average test scores over 4 years Magnet schools avg. gr 10 scores (CAT) higher than district avg. Magnet: reading 52%, math 56% District 49%, 54%	Magnet students higher attendance, lower suspensions, fewer drop-outs than non-magnets (within school magnets)
San Diego 1986-87	1 High School	Levels 1,2,3,4 Critical Thinking Assessment and Writing Assessment compared with non-magnet and students matched by pre-test scores	No measure reported	Observation & interviews to measure curriculum change Student survey on program content & attitudes Teacher survey on instructional practices Analysis of additional course enrollment by race/ethnicity & gender	No measure reported	Improved scores in critical thinking, no difference from non-magnet Writing scores of 10th gr. magnet students increased 2 3 points (scale 1 to 10), non-magnet no gain	Measure of magnet effect on upgrading curriculum and instruction
St. Paul 1985-87 District Report	8 Elementary 5 Jr High	Levels 1,3 SRA Stand test Fall & Spring for 2 yrs, reading, math, language writing, science (1 school) Parent attitude survey Student self-observation survey	2 Gifted & Talented magnets highly selective, Others by interest, selection not specified	Short program descriptions	No measure reported	Objectives to have 70% of students increase one grade unit in reading and math per year 4 of 5 elem magnets over 70% 5 of 5 Jr high over 70% in reading, 1 of 5 in math High parent satisfaction with magnets (no comparison schools)	Schools were to evaluate objectives based on magnet theme, no findings reported

Figure 1

STUDENTS IN DALLAS MAGNET HIGH SCHOOLS
(1987-88)

MAGNET HIGH SCHOOL	9th GRADE TEST SCORES				9-12 RACE/ETHNICITY			MAGNET ENROLLMENT
	N	READ	MATH	WRITING	BLACK	HISP	WHITE	
Arts	140	94%	94%	94%	33%	8%	59%	628
Business	242	91	87	73	83	14	3	1067
Educatior	30	87	85	85	62	20	18	110
Health	153	96	88	94	69	13	18	658
Govt /Law	69	97	97	83	60	17	23	218
Humanities /Communic.	30	83	80	90	98	1	1	130
e	43	93	95	86	42	16	43	115
ited & ifted	31	100	100	84	34	11	55	108
District 9th Grade Scores					District Race/Ethnicity			
	8737	77%	70%	62%	49%	29%	20%	

Figure 2

HOUSTON MAGNET HIGH SCHOOLS BY RATE OF ACCEPTANCE OF STUDENTS
(1987-88)

HIGH SCHOOL MAGNET ENROLLMENT			APPLICANTS NOT ACCEPTED	
Black	3620	44%	404	38%
Hispanic	2369	29%	164	15%
White	2229	27%	506	47%
Total	8218	100%	1074	100%

DISTRICT ENROLLMENT

Black. 42.5% Hispanic· 37.4% White 20%

Figure 3

DISTRICT STUDY BY LEVELS OF OUTCOMES ANALYSIS

	Level 1 Outcomes Measure	Level 2 Compare W/ Non-Magnet	Level 3 Over Time	Level 4 Student Charact	Level 5 Control Group
AUSTIN	X	X	X	X	
DALLAS	X	X		X	
DENVER	X		X		
HOUSTON	X	X			
LOS ANGELES	X	X			
MONTGOMERY CO	X	X	X	X	X
NEW YORK ST	X	X	X		
NEW YORK CITY	X	X			
PITTSBURGH	X	X	X		
ROCHESTER	X	X	X		
SAN DIEGO	X	X	X	X	
ST PAUL	X		X		